No. 814,224. PATENTED MAR. 6, 1906.

J. MAGEE.

HEATER.

APPLICATION FILED JAN. 7, 1906.

3 SHEETS—SHEET 1.

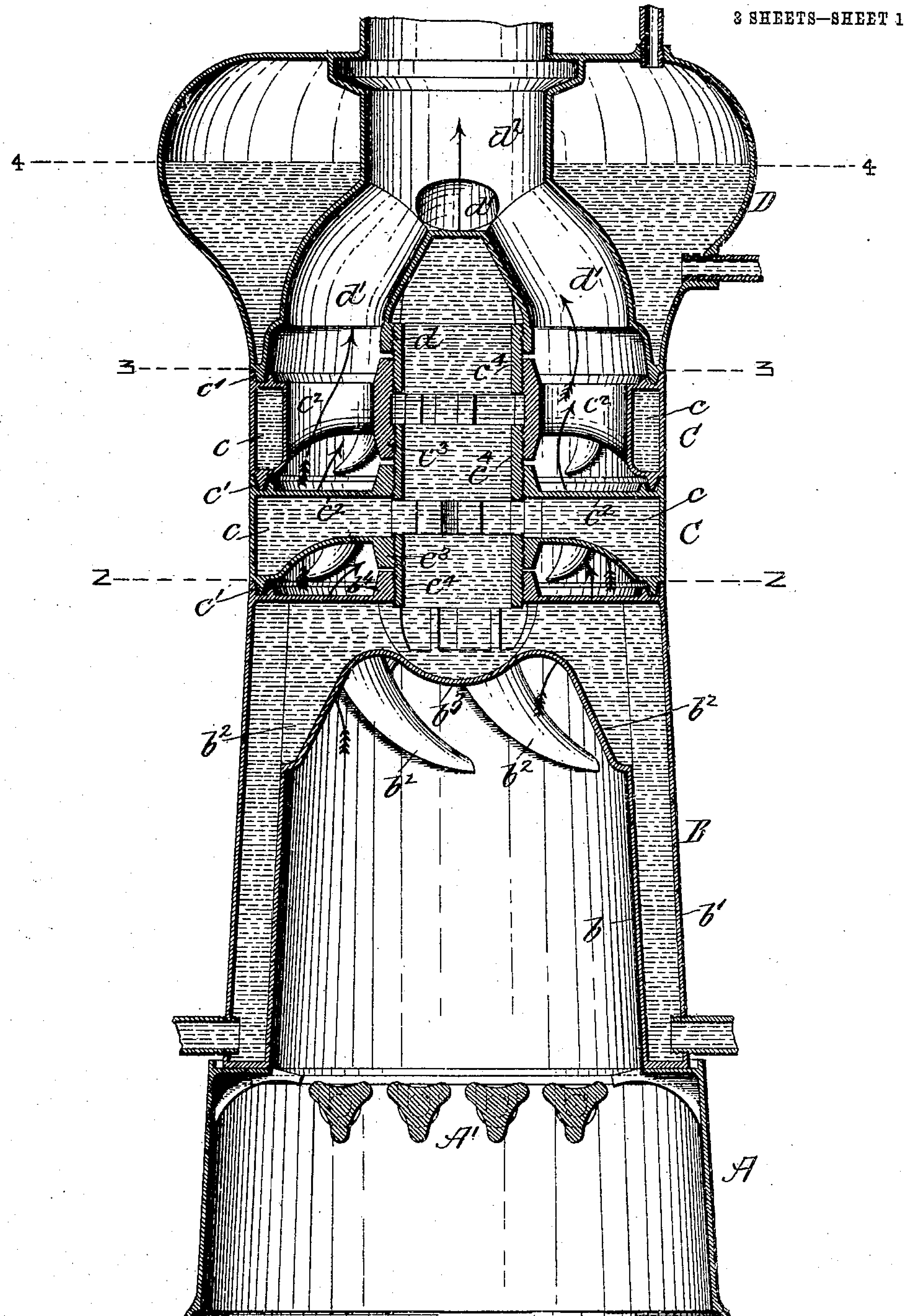

Fig. 1.

WITNESSES:

J. M. Dolan.

M. V. Foley.

INVENTOR:

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Clarke, Raymond & Coale.

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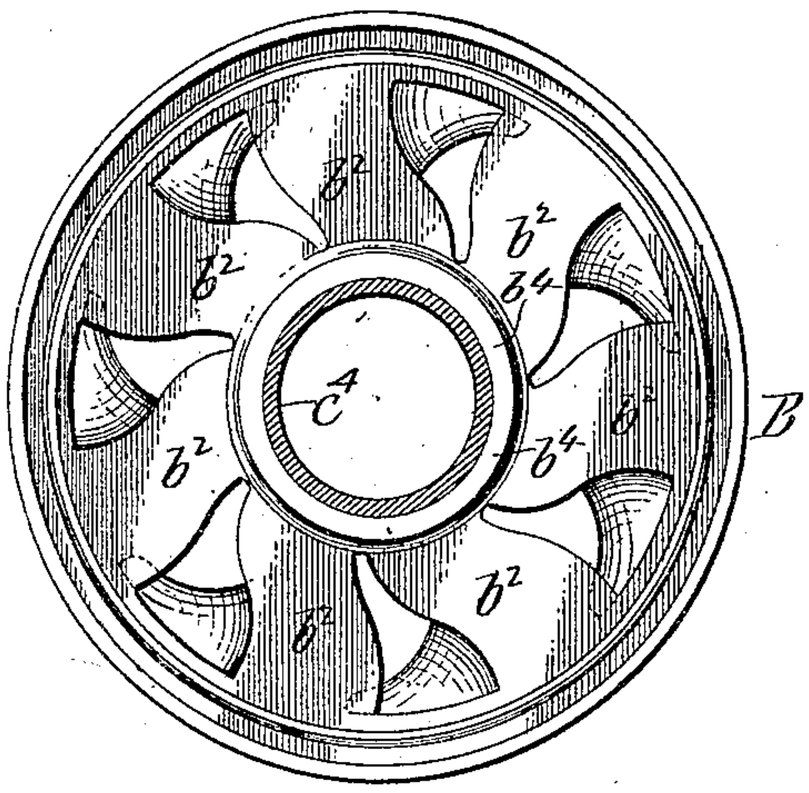

Fig. 2.

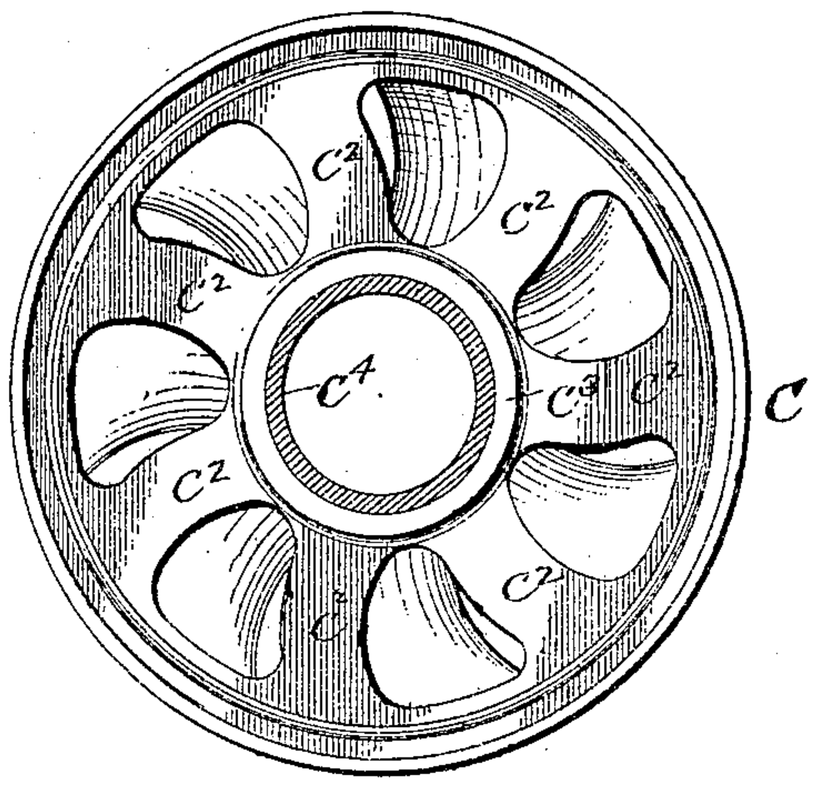

Fig. 3.

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3 SHEETS—SHEET 3.

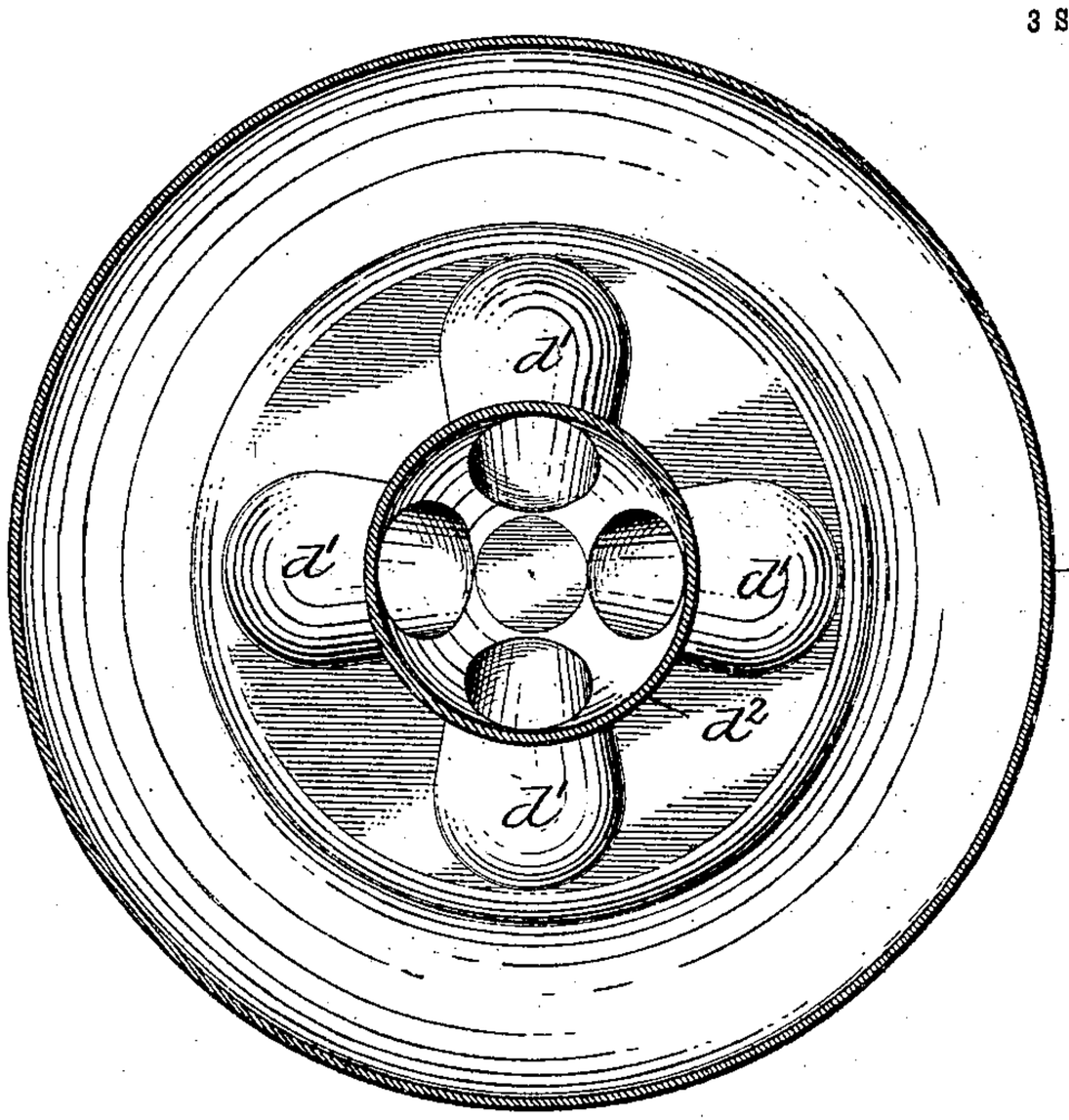

Fig. 4

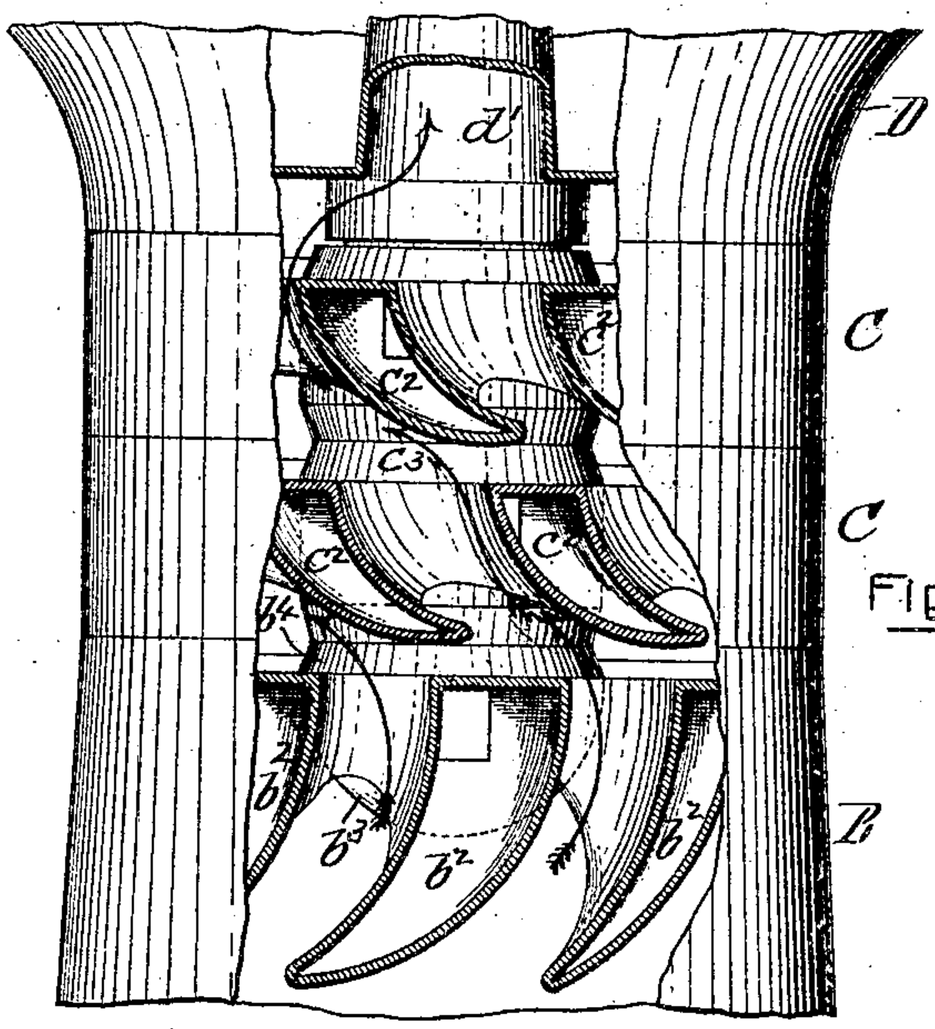

Fig. 5.

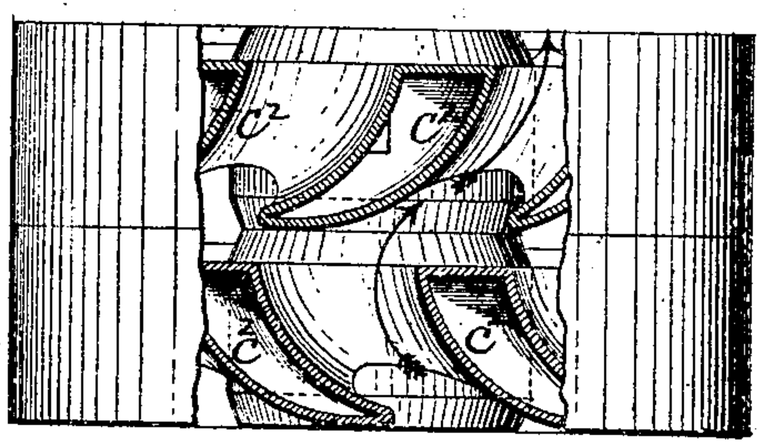

Fig. 6.

WITNESSES:

J. M. Dolan.

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INVENTOR:

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UNITED STATES PATENT OFFICE.

JOHN MAGEE, OF MALDEN, MASSACHUSETTS, ASSIGNOR TO MAGEE FURNACE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

HEATER.

No. 814,224. Specification of Letters Patent. Patented March 6, 1906.

Application filed January 7, 1905. Serial No. 240,009.

To all whom it may concern:

Be it known that I, JOHN MAGEE, a citizen of the United States, and a resident of Malden, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Heaters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

My invention relates to an improvement in heaters of the kind adapted to contain water to be heated or converted into steam.

The object of my invention is to provide a new mode of water distribution having a new arrangement of intersecting heat or flue passages, by which the water in the water-containing parts of the heater may be apportioned or distributed in thin or narrow sheets or columns having a large amount of heat-radiating surface, by which also the water-containing parts themselves bear such relation relatively to the heat flues or passages intersecting or passing by or through them that they act to hold or retard the heat and, moreover, with a manner of retardation which does not prevent it from becoming freely diffused and circulating over all the parts to be heated.

My invention further relates to various improvements in the construction of the heater and combination of its elements, all of which can best be seen and understood by reference to the drawings, in which—

Figure 1 shows the improved heater in vertical section. Fig. 2 shows in plan the top of the body of the heater, taken on the line 2 2 of Fig. 1. Fig. 3 shows a plan of one of the water-sections, taken on the line 3 3 of Fig. 1. Fig. 4 shows a cross-section through the water-containing head or dome, taken on the line 4 4 of Fig. 1. Fig. 5 shows in section an enlarged detail of construction to which special reference will hereinafter be made. Fig. 6 shows a slight modification to which reference will hereinafter be made.

Referring to the drawings, A represents the base of the heater, A′ its grate, and B the body forming or inclosing the combustion-chamber. C is a water section or sections (for there may be more than one) resting upon the body of the heater, and D the water-containing head or dome. The parts are thus generally referred to in order to show the relative arrangement of the water-containing parts of the heater and the intersecting heat or flue passages, which arrangement of said parts and passages constitutes my invention and to which reference will now be made.

The body B of the heater is made hollow with double sides b b', closed at the top and bottom and forming between them a chamber adapted to contain a thin annular column of water. From the side b at the top of the body of the heater there radiate inwardly the pipes b^2. These pipes are, as shown, preferably made quite narrow and where they join with the body of the heater are made relatively deep as they converge inwardly, with the effect that the under side of the pipes are made to arch in over the combustion-chamber. The pipes connect in common with an interior bowl b^3, which is located at a point about over the center of the combustion-chamber. The pipes b^2 are adapted to contain a considerable amount of water, and the bowl b^3 forms a water-chamber of considerable capacity, all of which, with the hollow sides of the heater, form the new system of water apportionment or distribution, which system contains not only a large amount of water, but holds it so disposed and distributed that the water will be quickly heated or acted upon by the products of combustion. With the water-containing parts thus arranged heat or flue passages for the products of combustion will be formed between the pipes b^2, by which the heat may pass up between these pipes to the water-sections or other water-containing parts above. In this connection it is to be noted that the heat or flue passages between the pipes are relatively large, extending from the bowl b^3 on the inside to the wall forming the body of the heater on the outside. The heat accordingly is not held or confined in the body of the heater, so that it will only heat the water located immediately around the combustion-chamber, but by these heat or flue openings, made large, as they are, the heat has free exit or passage out of the combustion-chamber, so that before its caloric effect is lost the heat rising may have opportunity to act upon the water-containing sections or parts above the

body of the heater. In order, however, that the heat may be somewhat confined, I make the pipes b^2 obliquely turned in form. This, in the first place, has the effect of making a long flue or heat-passage and one not so direct, for it necessitates of the heat or products of combustion coursing obliquely around in over the pipes b^2 instead of rising vertically between them, as it would otherwise do, and which, of course, acts to impede or retard the circulation. Moreover, by so making the pipes b^2 they are of larger capacity, and so contain more water. The obliquely-turned pipes provide also an increase of water-radiating surface by and over all parts of which the heat slowly and freely circulates. As for the bowl b^3, its bottom receives the direct impact rising from the combustion-chamber, and its sides also are fully exposed to the heat as it circulates up between the pipes b^2. The water-inclosing wall b is also exposed to the heat throughout its entire length. The water-containing parts of the body of the heater, therefore, are not only formed so that the water will be apportioned or distributed in narrow sheets or columns, but there is also provided a maximum heating or heat-radiating surface by and over all parts of which the heat may freely circulate with a slow but constant circulation. As for the water-sections C, (and by these are meant one or more sections, for a plurality of sections may be employed, if need be,) each section comprises a hollow peripheral rim c, adapted to contain a thin column of water. The rim of the lower water-section rests upon and makes a common cup jointure c' with the top of the outer shell or wall of the body of the heater. The rims of the other water-sections rest upon and make cup jointure with one another. Extending inwardly from the hollow rim of each water-section are the pipes c^2, which connect with an inner hub or pipe c^3. The pipes c^2, as shown, are preferably made slightly arched, being made deeper where they connect with the rims of the water-sections. The hub or pipe c^3 for the lower water-section joins onto the top of the bowl b^3 in the body of the heater by a connecting-nipple c^4, one end of which screws onto the top edge b^4 of said bowl and the other end onto the said hub or pipe c^3. Between the water-sections their hubs or pipes are connected by similar nipples, so that all united form practically one continuous hub or pipe or water-containing passage. There is thus obtained an auxiliary system of water distribution extending from the water-chamber of the bowl b^3 up through the connecting-nipples and hubs or pipes c^3 and thence out horizontally in narrow columns through the radial pipes c^2 into the hollow rims c of the water-sections. As for the heat or flue passages, they are formed between the pipes c^2 so that heat rising from the combustion-chamber in the body of the heater will pass through the flues or passages formed in the top thereof, as before explained, and into the chamber formed between the body of the heater and the first water-section above it and from thence will pass up through the heat flues or passages between the radial pipes c^2 of said water-section to the water-sections located above. By such an arrangement all the heat will circulate freely to all parts of the water-sections. It will radiate over the water-containing rims of the water-sections on the outside and on the inside over their hub or water-pipes c^3 and connecting-nipples. The heat will also radiate over the entire surface of the pipes c^2 of the water-sections. Moreover, these pipes c^2, like the pipes b^2 in the body of the heater, are made relatively deep and narrow and are formed also obliquely turned, which, as before explained, has the effect of making a pipe of large water-holding capacity and one which holds water in a thin winding column, by which it may be quickly acted upon by the heat coursing over the large heat-radiating surfaces. The obliquely-turned pipes provide also long winding flue-passages between them, which act to impede or retard the heat and make it flow slowly, and this, moreover, without forming recesses or pockets, which would act to prevent a free circulation. In connection with these obliquely-turned pipes it is to be noted that the turn of the pipes c^2 of the water-sections is preferably in a direction reverse to the turn of the pipes formed in the top of the body of the heater, so that the heat rising obliquely through the pipes b^2 in the body of the heater, as before explained, will not pass up through the water-sections on the same line of curvature, but, as may be seen by reference to Fig. 5, the heat will flow directly against the pipes c^2, especially in the lower water-section, and thereby be turned to flow in an opposite direction. This, of course, diffuses the heat and provides a better circulation. By such an arrangement also the pipes are exposed to the heat in a manner by which they may best be acted upon. As for the pipes of the water-sections, they also may to advantage alternately be turned reversely or in opposite directions, as shown in Fig. 6. I prefer, however, for expediency in casting that the water-sections all be made alike with their pipes obliquely turning in the same direction.

With reference to the water-containing head or dome D, it rests, as shown, upon the upper part of the water-containing sections C and makes cup jointure c' therewith. The interior of the dome connects with that of the water-sections by the nipple c^4, screwing into an annular flange d, encircling a hole made in the bottom of the dome, and which nipple at its other end connects with the hub or pipe

c^3 of the upper water-section. There are also formed in the flat bottom of the dome openings into the pipes or flues d', which pass up through the dome and converge into a common smoke or exit pipe d^2, which passes up and out through the top of the same. With the parts thus arranged the heat or products of combustion rising through the flues of the water-containing parts will course over the bottom of the dome, thence up through the pipes or flues d' into the exit-pipe d^2, through which it will pass up and out of the heater.

Among other advantages residing in the heater apart from those already referred to is the fact that the radial pipe system of water distribution through which the heat or flue passages are formed afford very little surface for the deposit of soot or other residue from the products of combustion. This, of course, increases the efficiency of the heater.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. A heater having over its combustion-chamber a series of pipes radially disposed, each of which pipes in form is turned obliquely to the vertical providing long, obliquely-extending flues or passages between the pipes.

2. A heater having over its combustion-chamber a series of pipes radially disposed, said pipes in form being turned obliquely to the vertical sufficiently to lap by one another and forming long, obliquely-extending flue-passages between them.

3. A heater having over its combustion-chamber a series of pipes radially disposed, each of said pipes in form being relatively deep, narrow and turned obliquely to the vertical, substantially as described.

4. A heater having a hollow side shell or wall in the body thereof encompassing the combustion-chamber, and a series of narrow pipes turned obliquely to the vertical extending inwardly therefrom, which pipes where they join said shell or wall in the body of the heater are formed relatively deep, gradually becoming of lesser depth, whereby they may be made to arch in over the combustion-chamber.

5. A heater having over its combustion-chamber a series of pipes radially disposed, said pipes in form being narrow, turned obliquely to the vertical and of a gradually-lessening depth, whereby they may be made to arch in over the combustion-chamber.

6. A heater having a series of pipes radially disposed, the body of each of which in form is turned obliquely to the vertical, substantially as and for the purposes set forth.

7. A heater having a body and in combination therewith a water-section consisting of an outer, hollow rim, adapted to rest upon said body of the heater and to make closed jointure therewith, a series of pipes radiating inwardly from said rim and connecting with a hollow hub, and a central hollow bowl forming a portion of said body of the heater, with the upper edge of which bowl said hub of the water-section is adapted to make closed connection.

8. A heater having a body provided with an outer, hollow wall surrounding the combustion-chamber, a central bowl arranged over the combustion-chamber, and a series of pipes b^2 turned obliquely to the vertical connecting said hollow wall and bowl.

9. A heater having a water-section consisting of a hollow, outer rim, a series of radial pipes connecting therewith, each of which pipes in form is turned obliquely to the vertical, whereby long, obliquely-extending passages or flues are formed between any two adjacent pipes.

10. A heater having a water-section consisting of a hollow, outer rim, a hollow, internal hub, and a series of pipes radiating from said hub to connect with said rim, said pipes in form being obliquely turned to the vertical and sufficiently to lap by one another, whereby long, oblique passages or flues are formed between them.

11. A heater having a series of pipes turned obliquely to the vertical and radially disposed over the combustion-chamber, and above said pipes another set or series of pipes likewise radially disposed, but turned obliquely to the vertical in a reverse direction to the turning of the first-mentioned pipes, whereby the heat passages or flues between said pipes will proceed in relatively different directions.

12. A heater having a water-section consisting of a hollow, outer rim, a hollow, internal hub, and a series of radial pipes c^2 connecting said hub and hollow rim, each of said pipes in form being turned obliquely to the vertical.

13. A heater having pipes radially disposed over its combustion-chamber and arranged in vertical series, each of said pipes in form being deep, narrow, and turned obliquely to the vertical.

14. A heater having a system of water distribution comprising a hollow, side shell or wall formed in the body of said heater, encompassing the combustion-chamber, pipes radiating inwardly therefrom over the combustion-chamber and forming heat or flue passages between them, a central bowl with which said radial pipes are adapted to connect in common, a water-section having an outer, hollow rim adapted to rest upon said body of the heater and make closed jointure therewith, a series of pipes radiating inwardly from said hollow rim and forming heat or flue passages between them, an inside hub or pipe with which said radial pipes of the water-section connect in common, means for con-

necting said hub or pipe with said bowl of the heater-body, a flat-bottom, water-holding dome above said section making closed jointure therewith, means connecting the interior of said dome with said hub or pipe, and heat flues or passages extending through the water-holding interior of said dome and in communication through the bottom thereof with the heat flues or passages formed between said radial pipes, as aforesaid.

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Witnesses:
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J. M. DOLAN.